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Propagating Trees and Plants



Simple Directions for Propagating Many
of the Common Fruits of Orchard and
Garden; for Use by the Farmer
and Others Who Grow Fruit
in a Small Way.

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PUBLISHED BY THE FRUIT-GROWER COMPANY
SAINT JOSEPH, MISSOURI

1905

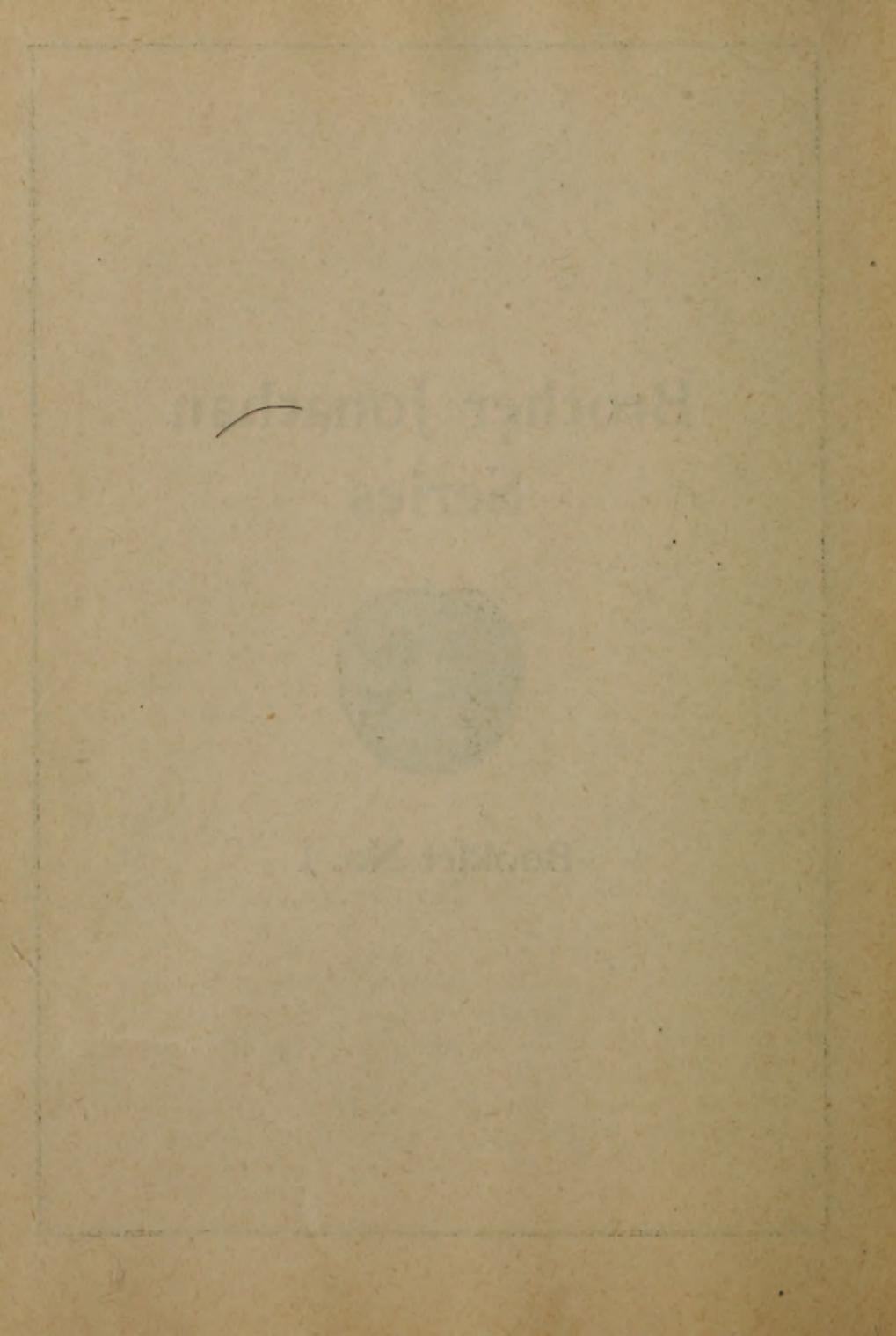
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Brother Jonathan Series



Booklet No. 1



Introductory

The Editor of THE FRUIT GROWER is responsible for the appearance of this booklet. Being in close touch with farmers and fruit growers, as well as a host of professional and business men in city and town, who are interested to some degree in fruit growing, he has had abundant opportunity for learning their needs. The question department of THE FRUIT GROWER bears ample testimony to the demand for popular information in regard to the propagation of many of our common fruits.

There is no good reason why any farmer, if he so desires, may not propagate all of the fruits necessary for his home garden or orchard. Such work can be done with little or no expense, and besides, it is pleasant and interesting for the boys of the family. If one knows how to propagate certain plants he can often save his money by purchasing a few specimens and from these propagate any number desired. Some of the best varieties of many of the fruits are often quite expensive and of such it would be necessary to purchase only one or two specimens and grow the rest from these at home. There are other advantages also in growing fruits for planting for home use, such as being sure that they are true to name and knowing that they have not been injured by exposure before being planted. In this booklet no attempt will be made to give a complete discussion of the methods of propagating all of the fruits. It is the intention to give a list of only the more common fruits and to discuss them from the standpoint of the farmer who does not expect to become a nurseryman or to grow the plants in a wholesale way. The various fruits will be taken up alphabetically rather than by any other classification.

Propagating Trees and Plants

All of our fruits and vegetables are multiplied or increased either from seeds or buds. Nearly all of the vegetables are grown from seeds, while comparatively few of the fruits are propagated in this way. It is quite true that the fruits have their beginning with the seed, but since we cannot depend upon varieties coming true from seed, we must rely on grafting, budding, etc., these being methods of bud reproduction.

APPLES.

The apple is usually propagated either by grafting or by budding. Grafting is the more common way and the one in most general use. There are two principal forms of graftage: one, the whip- or tongue-graft, usually used in uniting a piece of twig to a section of root; the other, the cleft-graft, employed in top-working trees that are several years old, in the field. In describing how to propagate apple trees by whip- or tongue-grafting it is necessary to begin at the beginning, that is, with the seeds, for by this method we must grow little apple roots upon which to graft the scions (twigs) of the varieties of apples we desire to have. In the fall of the year save the seeds from the apples used about the house. If it is convenient to get apple pomace (the ground-up and squeezed-out refuse of apples) from some place where cider is being made, the seeds can be collected rapidly. Pour the pomace into a barrel two-thirds full of water and stir the mass with a stick. The seeds will settle to the bottom as they are separated from the flesh of the apple and the coarser part of the pomace may be skimmed off. The fine particles of the pulp will settle down with the seeds and unless one has a wheat sieve at hand to help, it is a tedious matter to separate all of the seeds from the pomace. It is more agreeable, of

course, to have all of the seeds clear of the pomace but it is not at all necessary. When apples are being dried or canned the children may cut the seeds from the cores; a surprisingly large number of seeds may be secured in a very short time in this way.

After apple seeds have become dry they will not sprout without having been frozen. To freeze the seeds treat as follows: Secure a wooden box 12 to 24 inches square and 6 to 10 inches deep. Spread a layer of sand in the bottom an inch deep. On this



Fig. 1.

spread a layer of the apple seeds. Make alternate layers of sand and seed in this way until the box is filled or all the seeds used up, as illustrated in Fig. 1, where is shown a box of stratified peach seeds. Be sure that there is a layer of sand an inch or two thick on the top of the box. To keep out mice it is a good idea to tack some fine wire netting over the

Fig. 1—Box of stratified peach seed; side of box removed to show arrangement of seeds in the sand.

box. The box should have several holes bored in the bottom in order to secure good drainage. About the first of December place the box on the north side of a building, sinking it slightly in the earth in order to keep the sand moist. Do not cover the box but leave it exposed so that the rain and snow may get in and help to keep the sand from drying out. This process is called "stratifying" the seeds and it does not matter if there is some of the pomace left with them when they are mixed with the sand.

The seeds are to remain stratified all winter. The freezing and thawing softens the seed coats so that germination will take place quickly and easily after they are planted. The seeds need not be disturbed until they are ready to plant in spring at gardening time. Prepare the seed bed with care. Select a place where the soil is deep and fairly rich. It is very important that the soil be deep so the roots can go straight down, for it is the roots that we are after and the longer they can be made to grow the better. Plow the land deeply and prepare as for garden plants. Lay off rows four feet apart and sow seeds about as thickly as beets or peas, in the rows. Instead of using soil it is a good idea to cover the seeds with **thoroughly rotted** chip-dirt, straw or manure, but whatever is used should be free from weed seeds. Cover the seeds only about an inch deep. If the spring is late the seed boxes should be watched very carefully as the seeds may begin to sprout before we are ready to plant them. If they begin to sprout they must be planted at once, even though the soil be too wet to work properly. If they are covered with the material mentioned above they will not suffer from planting when too wet.

Give the little seedlings good cultivation by plowing and hoeing throughout the summer, thus keeping them growing vigorously. Late in the fall after the



Fig. 2.—Apple stock. At (a) is shown a No. 1 apple root of one season's growth from the seed. This is cut into 3-inch sections for making root grafts; (b), shows the same root after being properly cut into pieces; (c), shows seedling top, and (d), tip of root—both to be discarded.

leaves have been shed, or by the first of November, whether the leaves are off or not, the plants are to be dug up, tied in bundles and stored in the cellar. (See Fig. 2 for seedling apple root for grafting.) It may be necessary to strip off the leaves. If the tops are long, clip them off slightly and pack the bundles in boxes with green sawdust pressed around them. Sand that is slightly moist may be used, but it is not as good as the fresh sawdust. Dig into the boxes occasionally and if found to be drying out the sawdust should be sprinkled with water.

The scions for grafting on the roots may be taken from the trees at any time after the leaves have fallen, but it is much better to cut them before the first hard freeze. Never cut scions (twigs) from trees while frozen; if cold weather comes on suddenly before the scions are taken, wait until they are thawed out. It is first necessary to decide what varieties are wanted, then go to a healthy tree that is known to produce good crops of the desired sort and cut from it the best twigs of the last season's growth. Wood that is two years old is not suitable for grafting. If we prefer to take the scions from a young tree it may

be possible to get them as much as two feet long,

Fig. 2—Apple stock. At (a) is shown a No. 1 apple root of one season's growth from the seed. This is cut into 3-inch sections for making root grafts; (b), shows the same root after being properly cut into pieces; (c), shows seedling top, and (d), tip of root—both to be discarded.

but they can be used if the growth has not been more than four or five inches, which may be the case with old trees. Water sprouts, where they are growing well above the ground, may be used if they are well matured. Never make the scions of soft, spongy, immature wood or any which has refused to shed its leaves. If the scions are taken from the trees early they should be packed in green sawdust like the roots.

The grafting should preferably be done in a cellar or basement room, but may be performed in a moderately warm living room, if the materials are kept packed until ready to use and then repacked as soon as the grafts are made. Do not work about an open fire or near a hot stove, as both the roots and twigs may be dried out and seriously injured. Grafting may be done in January or February or even early March at the north, but February is usually the best month.

Making the Grafts.—If the twigs are long enough make the scions about six inches long, but they may be made shorter if necessary. (See Fig. 3 for long and short twigs before and after being made into scions.) On the butt end of the scion make a sloping cut an inch or an inch and a half long, as shown in Fig. 4a. Use a sharp knife and make the cut smooth and uniform. On the sloping cut surface, about one-third of the way from the end of the twig, make a slit or "tongue" by a downward cut, from one-half to an inch deep along the grain of the wood, as shown in the illustration Fig. 4a. After becoming accustomed to the work, it would be better to form the sloping cut, make the tongue and then cut off the scion of the desired length.

Next take one of the long seedling roots shown in Fig. 2a and 2b, and follow the same process. Begin at the crown (the part of the root that was

just at the surface of the ground) and form a sloping cut, being careful that it is of the same slope as that of the scion and make the tongue in the same way and

at the same distance from the end of the root as in the scion. (See Fig. 4 b.) This done, cut the root off, having the piece about three inches long and repeating the process until the entire root is used. If the seedlings have made a good growth and the soil has been porous enough to let them go down, each root will usually make two and sometimes three pieces. Observe in Fig. 2 how the seedling root has been cut in two pieces about three inches long.

Join the root and scion by pressing the two sloping surfaces together and forcing the tongues to interlock. At this point the main thing to be observed is to watch one side and see that the bark line of the scion comes exactly in contact with the bark line on the root. This is highly important, for here is where the

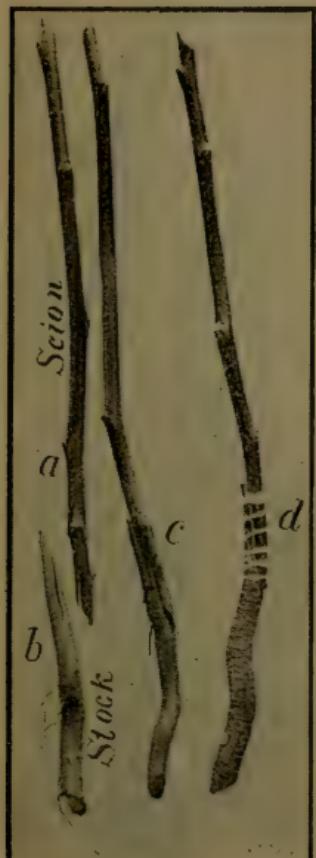


Fig. 4.

two are to grow together. The scion and root may not be of the same thickness, in fact, seldom are, but this makes no difference if the above instructions are followed. Fig. 4c shows the scion and root

Fig. 4—How to make the whip- or tongue-graft. At (a) is shown how to make the sloping cut and the slit or tongue in the scion; (b), shows corresponding sloping cut and tongue for the root or stock; (c), shows scion and root properly united; (d), proper manner of tying the splice.

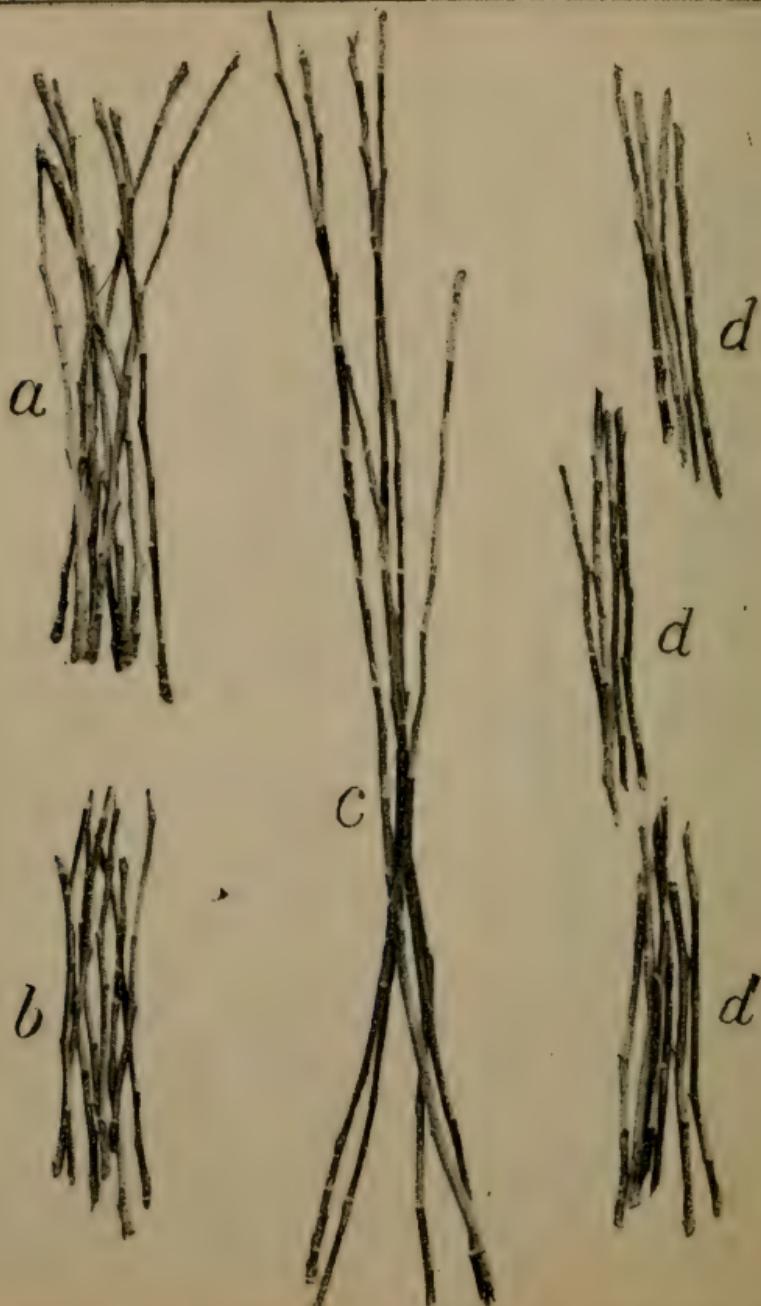


Fig 3—Long and short twigs before and after making into scions: (a), short growth from an old tree; (b), the same after being made into scions; (c), long twigs from vigorous trees; (d), the same after being made into scions.

properly united. After pressing the two pieces together, it will be necessary to wrap the graft at the point of union with No. 18 or 20 cotton knitting thread. Lay the thread on the wood near the end of the cut, wind two or three times around at this place, at the same time pressing the parts tightly together with thumb and finger; next work the thread up to the other end of the cut by winding it two or three times around the graft during the distance, then two or three times around the other end of the cut as in the beginning and fasten the end of the thread by drawing it down in the cut and, by a sharp jerk, break it off. This completes the process. The finished graft should be from seven to nine inches long. (Fig. 4d.) The old way was to wax the point of union or wrap with waxed thread or strips of cloth, but this is not necessary.

Pack the grafts in bundles of fifty to a hundred each, and store in green sawdust where they are to remain until planting time. While packed in the sawdust the cut surfaces which have been joined together will actually begin to heal over and partially unite, and on this account the grafts should not be disturbed until they are taken out to plant. Keep the box of grafts in a cellar or moderately cool room. They must not be permitted to freeze, neither must they be allowed to dry out. It may be necessary to sprinkle the sawdust a few times before spring.

Planting. As soon as the ground will do to work in the spring, select a place where the soil is moderately rich, but not extremely so, on which to plant the grafts. Plow the land deeply and otherwise prepare as for a garden spot. The rows need not be long but should be perfectly straight. To get them straight stretch a string or wire across the plot. The rows are to be four feet apart, but are not to be laid off with a plow. With an old hoe-handle which has

been sharpened to a point, with a long slope, go along the line and punch holes in the ground about eight inches apart, withdrawing the pole carefully, with many side movements, so the soil will not fall in. Plant the grafts deeply. After placing them in the holes, see that only one or two buds of the

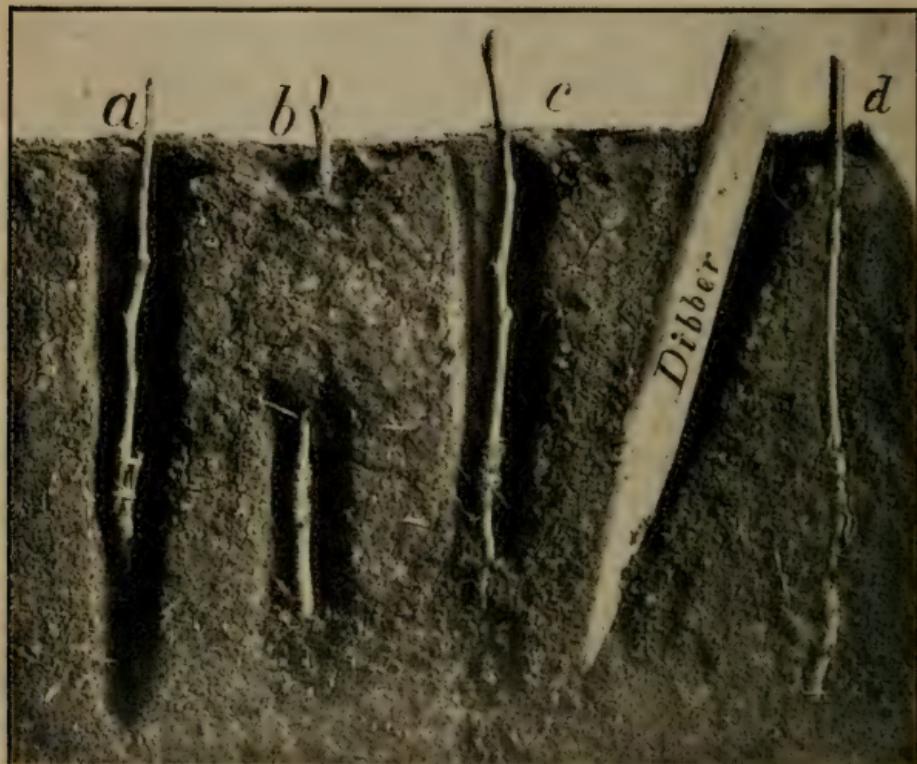


Fig. 5.

scion are left above ground. This will make it necessary to have the ground plowed deeply. Be sure to **press soil up closely against the roots of the grafts.** This is best done with a dibber or short stick

Fig. 5—Planting apple grafts. The soil must be pressed tightly about the roots, a dibber being a good instrument to use for this purpose. At (a) is seen the graft dropped into the hole; (b), where the soil is pressed up against graft with the hands; imperfectly planted, note air space at bottom; (c), how soil is forced up against graft with a dibber; (d), after being covered with a dibber—no air space left, soil fits snugly against all parts of graft.

which is forced into the ground beside the grafts and crowds the soil up against them. (See Fig. 5.) The grafts cannot grow if air spaces are left around the roots. Here is where more people fail than at any other point. Give the little trees good culture, including two or three hoeings during the summer and with a reasonably fair season they will reward their owner with a vigorous growth.

Early the following spring, before growth begins, go through the nursery and carefully trim off any branches that may have formed up to a height of 18 or 20 inches. The trees may be set in the orchard after one season's growth, but all things considered, it is usually more satisfactory to allow them to grow two seasons in the nursery row before transplanting. They may be set in the orchard in the fall if there has been rain enough to make the ground moist. Most trees are set in the spring, which is usually the most satisfactory, especially in the north.

Cleft-Grafting. While the whip- or tongue-grafting, described above is the method in most general use by nurserymen for the propagation of apple trees in wholesale quantities, there is another form known as cleft-grafting that is used very extensively by farmers and others who have but few trees. Cleft-grafting is especially useful where one has an apple tree that has reached bearing age and is found to be unsatisfactory either in the kind or quantity of its fruit. The tree may be cut down, if not too old, or its main branches may be sawed off in early spring and have the desired variety of apple inserted upon the stump. Cleft-grafting is sometimes used on other trees besides the apple. This method is also sometimes called top-grafting. As many varieties as there are branches to work them upon may be top-grafted upon a single tree. It is a matter of great curiosity to see apples of different colors and sizes growing on the same tree. New varieties

may be hurried into bearing by being worked upon the branches of an old tree.

It will be necessary to collect the scions for top-grafting early in the winter before freezing and store them in the manner described above. The

grafting is done in the early spring at the time the leaf buds are beginning to open. At this time the sap in the tree to be top-worked will be flowing freely, but the scion to be inserted upon it is perfectly dormant in a cellar.

To do the work, saw off the old branch if as much as an inch in diameter, or even the body of the tree (Fig. 8), if it is not more than four inches thick, and split the stump down through the center with a knife or hatchet (Fig. 9). The scion (which is of the same kind of wood as described for other scions) should be only four or five inches long, and at the butt end whittle on both sides to a wedge shape, as shown in Fig. 7. In making the wedge the slope must be long and uniform, care being taken to whittle about the same amount of wood from each side. Pry open the split in the trunk or branch to be grafted and carefully insert the scion so that the bark on one side will be exactly in contact with the inner

part of the growing bark of the old stub or stump. (See. Fig. 9.) This is extremely important, for here is the place where they are to grow together



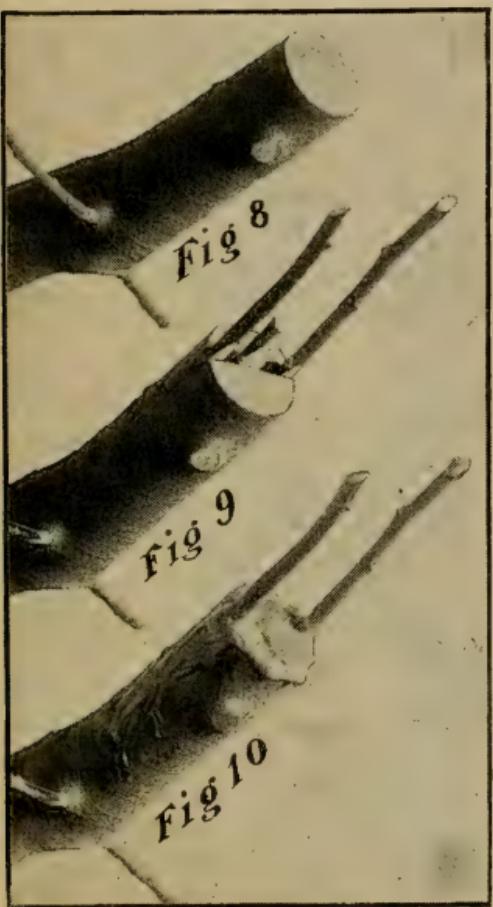
Fig. 7.

Fig. 7—Scions whittled to a wedge-shape for top-grafting.

and they cannot do so unless the bark of one piece is exactly in line with the bark of the other. If the old branch or trunk of the tree is large enough, that is, thick enough, it is advisable to use two scions, one on either side of the stump, as this will double the chances of success.

If the grafted stump be as much as three inches thick, a wedge for the purpose should be made and driven down in the center of the cleft just far enough to prevent too great a pressure on the scions and yet not far enough to cause them to be loose. After driving down to the proper point, the wedge may be broken off. When the scions and wedge are in place it will be necessary to cover all cut surfaces with hot grafting wax. (See Fig. 10.)

The wax may



Figs. 8, 9 and 10.

at the house and carried to the orchard if not too far away. It is best to have a little paddle with which to dip up the molten wax and spread it over and around the scions in such a manner as to entirely exclude the air and thus keep them from dry-

Fig. 8—A branch sawed off and ready to be split for grafting.

Fig. 9—A branch with two scions correctly inserted in the cleft with wedge between them to prevent their being crushed when the branch is large.

Fig. 10—Cleft-graft covered with grafting wax.

ing out until they unite with the old wood. This wax should never be disturbed afterwards, as it will not injure the tree.

If both scions grow, by all means cut one of them out. If both are allowed to stand, a forked tree will be formed, which is always to be avoided.

In Fig. 11 is shown an eight-year-old worthless seedling apple tree which has been top-worked to a known variety. The new growth should bear fruit in three years.

To Make Grafting Wax. Common rosin seven pounds, beeswax two pounds, tallow 1 pound. If so much is not desired, divide each of the above



Fig. 11.

items by two, three or four as may be needed. Melt all of the ingredients together in a pot or

Fig. 11—An 8-year-old seedling apple tree which has been top-worked to a known variety.

pan over a slow fire, stirring thoroughly. When they are well mixed, pour a part of the mass into a small tub of water until partially cooled, then take it out and pull like taffy candy until it becomes too stiff to work. Roll into balls as large as a man's fist and store away until needed. It will keep indefinitely.

Budding. Apples may be propagated readily by budding the last week of August or early in September. The buds must be inserted in the wood that grew the same season that budding is done. If trees grown from the seed are to be budded, they may be too small to bud the first season. In this event, they should be cut back to the ground, and the new sprouts budded the following year. The branches of old trees are sometimes cut off, and the new growth that is made may be budded at the proper season. (A detailed statement of how budding is done will be found under the head of peaches.)

Dwarf Apples. Any of the common varieties of apples may be grown as dwarfs (only a few feet high), provided they are worked upon the well-known Paradise or Doucin stock. These are natural dwarfs and when used as stocks upon which to bud or graft they cause the trees so grown to be very small of stature. Dwarf apple trees come into bearing much earlier than others, but do not live nearly so long. Dwarfs are sometimes grown in pots.

APRICOTS.

The apricot is like the apple, in that it will not come true from the seed and therefore must be propagated by budding or grafting, the former being generally employed. For the best results, seeds should be stratified in sand and frozen during the winter as described for apples. Apricot seed, however, being larger and more able to meet adverse conditions than the apple, are sometimes planted in the fall in well prepared ground. Here they freeze and come up without delay in the spring. If stratified for freezing (see apple) they should be planted in early spring before they have begun to sprout. The young seedlings are to be given good culture during the summer, but are not to be dug up in the fall like apple seedlings. If they are to be budded, the work should be done about the first of September, during the first season's growth. If it is desired to graft them, the seedlings should be cleft-grafted near the ground in early spring, at the beginning of the second season's growth, under conditions already described for the apple. If buds fail to take in the fall, they may be grafted in spring. One year's growth after being either budded or grafted should make sufficiently large plants for setting them in the orchard. For details of budding, see discussion under **The Peach**.

The apricot is often budded upon the peach, as the latter thrives upon a greater variety of soils than the apricot. The common plum makes an excellent stock for the apricot where it is grown in wet situations.

BLACKBERRIES.

Blackberries are propagated in two ways, from sprouts and by root-cuttings. The blackberries sprout readily and it is a simple matter to dig up the new plants and set them out where needed. By means of root-cuttings the blackberry may be multiplied very rapidly. In late winter, or early spring, before growth has begun, a few long roots may be dug from the old plants. In the cellar these roots may be cut into pieces two or three inches long.

They should be at least as thick as a lead pencil and not more than half an inch in diameter. The pieces may be stored in green sawdust and kept until planting time in April.

The preparation of the soil should consist first, of plowing deeply in the fall previous to planting. In spring harrow both ways until all the clods are broken in small bits. Lay off rows 4 feet apart with a single shovel plow. In April at gardening time the

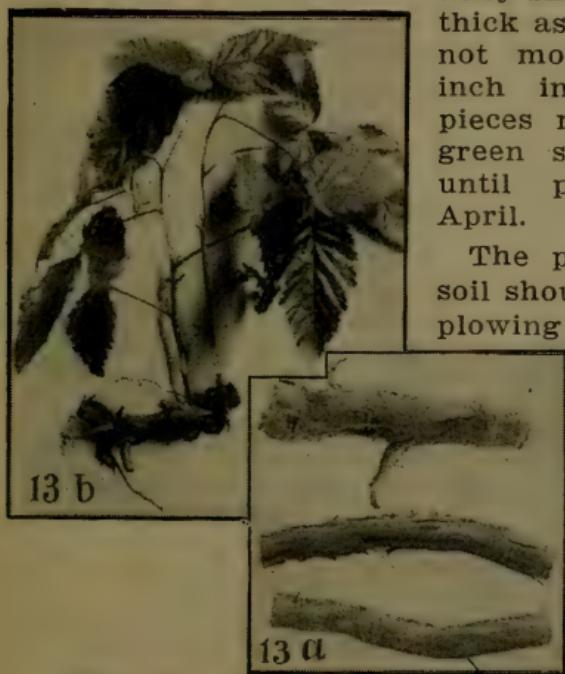


Fig. 13.

root-cuttings may be planted. Sow them in the furrow 2 or 3 inches apart and cover 2 inches deep with loose soil free from heavy clods.

In Fig. 13 a and b, will be seen blackberry root-cuttings before and after beginning to grow. It is

Fig. 13—Blackberry root-cuttings: (a), before planting; (b), after sprouting.

best to allow the plants to grow for two seasons in the nursery row and then transplant them early in the spring to the permanent planting. The one-year-old plants are so small that no time is gained by planting them. The rows should be 6 to 8 feet apart and the plants 3 feet apart in the rows. Owing to the habit of the blackberry of sprouting quite freely, the plants will soon form a solid mat along the rows and will also fill the spaces between the rows if not kept down by constant cultivation. If neglected for one or two seasons, they will spread over all the ground and it will be very difficult and expensive to harvest the fruit.

CHERRIES.

The cherry is propagated almost entirely by budding. While seedlings from our common varieties may be used for growing stock, nurserymen always use special kinds of stock which are usually imported from France. The kinds of stock in most general use are the Mazzard and Mahaleb. The Mazzard is the best stock for both sweet and sour cherries in the east. The Mahaleb is more widely used for the sour kinds, however, for it is easier to bud, and is free from leaf blight in the nursery. The Mazzard, however, appears to form a better root system, stronger union, a longer lived tree and is sufficiently hardy. For the plains states the harder Mahaleb stock should be used. Both of these may be secured from most any nurseryman in early winter or spring. In a small way it is quite feasible to grow one's own cherry stock from the seeds of the fruit raised at home.

Cherry seeds should not be permitted to become thoroughly dried out at any time. On this account it is advisable to store the seeds through the remainder of the summer after ripening, in boxes of sand and bury them from eight to twelve inches deep in

the ground in a cool place. This will keep them moist, and at the same time they will be sufficiently cool and away from the free circulation of air that they will not begin to grow.

At the approach of cold weather the seeds should be taken up and the open boxes of sand kept on the surface of the ground in the shade of a building throughout the winter. Very early in the spring the seeds should be planted in nursery rows four feet apart and an inch or two apart in the rows. Cover with an inch or two of fine soil, if the ground is not too wet. If the seeds are about to sprout and the soil is yet too wet to work well the seeds should be partially covered with the wet earth and then a dressing an inch thick of well rotted manure spread over the rows.

The young seedlings should have thorough cultivation during the summer. About the last week in August or the first week in September when the bark peels readily, the budding should be done. In the South where the spring opens much earlier the seedlings may be large enough for budding in June. In that event one year's time is saved, as the tops are cut off immediately, and the young trees often grow to transplanting size the same season. Full details for the budding will be given under the discussion of peaches. When the trees have had one year's growth from the buds, they are of the proper age to be transplanted to the orchard. Cherry seedlings are sometimes cleft-grafted in spring, where the buds the previous fall failed to take. (See cleft-grafting under apples.)

CURRANTS.

Propagation of the currant is best effected by means of long hard wood cuttings, taken either in fall or spring. In nursery practice they are commonly taken about September first as soon as the

leaves fall. The leaves are sometimes stripped from the plants a week or so before taking the cuttings, if they have not already fallen. The cuttings may be planted at once in the nursery rows or tied in

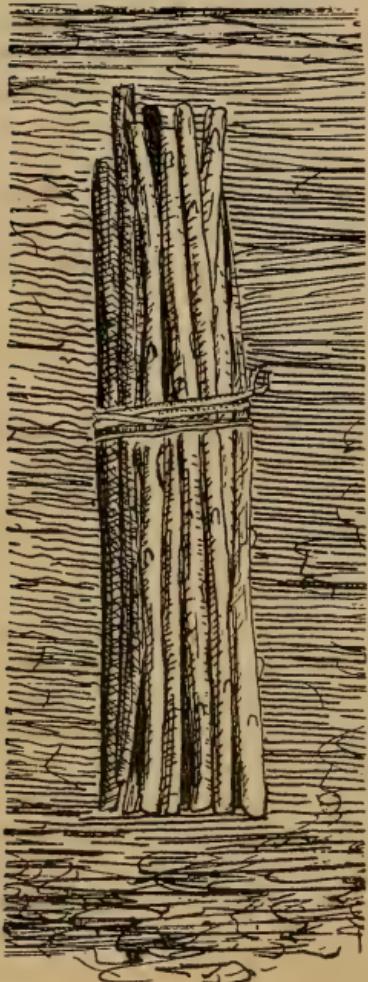


Fig. 14.

commoner practice is to plant the cuttings in nursery rows soon after they are taken. They are said to root more quickly if packed in damp moss a week

bundles and buried upside down with two or three inches of soil over the butts. They should be buried in a well-drained place where they will not become water-logged if rains should come during the autumn. Fig 14 shows bundle of cuttings buried upside down, preparatory to storage or planting. At the approach of cold weather they may be taken up and planted in nursery rows and covered with a mulch of soil or other material during the winter, this mulch being raked away to expose the tips early in spring.

Planting may be delayed until spring, the bundles being taken up and stored in sand or packing moss in the cellar, or more deeply covered with soil and allowed to remain where they are buried outside. The com-

Fig. 14—Currant cuttings in a "callus pit." They are buried upside down in the soil for two or three months in the fall to cause them to root readily when planted.

or two before planting. It is very essential to mulch the fall planted cuttings with some kind of material; probably nothing surpasses the soil itself for this purpose, especially in the dry climate of the plains. If the cuttings are kept until spring, planting must be done very early, as growth begins when the weather is yet cool. This makes spring planting undesirable in nursery practice.

Cuttings vary in length from 6 to 10 inches, according to soil and climate. The drier the climate and the lighter the soil, the longer the cuttings should be. In planting, only one or two buds are left above the surface, and the soil should be pressed firmly against them all the way down to the base. Rich, moist soil should be selected in which to plant them.

Another method of propagating currants is by what is known as **Mound-Layerage**. This consists of drawing the soil up around the plants until the lower parts of many of the branches are covered as shown in Fig. 15. Left in this way for one or two seasons they readily take root, and may be cut away, each branch making a separate plant. When grown from cuttings, the plants may be either one or two years old when transplanted to the field. The rows are commonly marked off 4 to 6 feet apart, and the plants set from 3 to 4 feet apart in the rows.



Fig. 15.

DEWBERRIES.

Dewberries are propagated very rapidly by a process of runners or natural layers. It is the habit of the plant to sprawl upon the ground, and a large number of the branches that come in contact with the soil readily take root. These may be cut away and make good plants. The dewberry is also readily propagated by means of root cuttings, like the blackberry (which see).

Dewberries may be transplanted either in fall or in spring. They should be set in rows from 4 to 6 feet apart and about three feet apart in the rows.

GOOSEBERRIES.

The common gooseberries are propagated either by cuttings, which are made and handled as described for currants, or by mound layerage, also described for currants. English gooseberries are largely propagated by the latter method.

When the rooted cuttings or layers are one or two years of age,—preferably two—they are ready to be set in the permanent planting. Gooseberry rows should be about 6 feet apart and the plants 4 feet apart in the rows. This will permit them to grow large and spreading without crowding each other, and yet leave room for cultivation one way.

GRAPES.

Grapes are propagated almost exclusively by means of cuttings, although a few of the refractory varieties, like the Norton's Virginia Seedling and Cynthiana, do not root readily and hence have to be increased by means of layerage. For this purpose the vine is pulled down in spring and covered with soil at intervals of 2 feet. If the vine be slightly twisted or otherwise bruised at the points where covered, they will readily take root and form strong plants

during the season. Late in fall or the following spring the vine may be cut in sections, each part having roots being a separate plant. Fig. 16 shows a layered grapevine.

Nearly all of the many scores of varieties root readily from cuttings. Grape cuttings should be made in early winter before there has been a hard freeze, from wood of the last season's growth. Vines



Fig. 16.

with the joints close together make better cuttings than those having the joints far apart. Begin at the butt end of the vine, cutting it off squarely just below a joint or node. Counting this joint one, skip two more joints and cut the vine off at least two inches above the third one. It is best to have at least three joints for each cutting, although it is not absolutely necessary to have but two. The cuttings will range in length from 10 to 18 inches, although the majority are usually about 12 inches

long. See Fig. 17 (a) for picture of single-eye cuttings, and (b), ordinary 3-eye cuttings as commonly made.



Fig. 17.

Pack the cuttings in bundles of fifty each and store in green sawdust in a cool cellar until spring. The ground on which grape cuttings are to be planted should be moderately rich and plowed very deeply, preferably the fall before they are planted. The cuttings should be planted out early in April, care being taken to see that their buds have not begun to push out while packed in sawdust. In the nursery the rows should be four feet apart and perfectly straight, being lined up with a wire or garden line. The cuttings may be

Fig. 17—At (a) are shown several single-eye grape cuttings; (b), the ordinary three-eye grape cuttings as commonly made.

planted by making holes about four inches apart, like planting apple grafts, or a furrow from 8 to 10 inches deep may be made. In either case the cuttings should not stand up straight, but should lean toward the south and the soil be packed very firmly around the bottom joint; only the top bud should be left above ground and the soil should be almost up to it.

The cuttings will often strike root from both the joints under ground, thus making very strong plants. They should grow in nursery rows for one or preferably two years, when they are ready to be moved to the permanent planting. The vineyard rows should be from 8 to 10 feet apart and the vines from 6 to 8 feet apart in the rows. At the time of planting the vines should be cut back, leaving only about two buds to each branch.

Old grape vines are sometimes renewed or the varieties changed by cleft-grafting. This is done in the manner described for cleft-grafting the apple, except that the soil is drawn away from around the plants and the vines sawed off below ground at least 3 or 4 inches. The vine is split open and two scions inserted and the earth packed around them. It is not necessary to use grafting wax on the wound. The soil should be drawn around the scions, leaving only one bud of each above ground.

Single-eye Cuttings. When wood for making cuttings is very valuable or scarce, rapid propagation is effected by means of single-eye cuttings, using either the matured wood of the new growth in fall or, the green, growing wood in summer. The cuttings in either case are made by using only one joint for each as shown in Fig. 17 (a), and must be started into growth by being covered an inch deep, while lying flat in a sand box or bed in a greenhouse or hotbed. Single-eye cuttings make weak vines.

NECTARINES.

The propagation of the nectarine is in every way like that of the peach. In reality the nectarine is a form of smooth-skinned peach. Formerly it was thought that the nectarine was a distinct species of plant, but it is now known that nectarines often come from seeds of peaches and peaches have come from seeds of nectarines. Either may originate from the other by means of bud variation. Because of the smooth skin of the fruit it is perhaps more liable to the attacks of the curculio. It is less popular in the market than the peach and therefore is less grown, although in California it is planted on a commercial scale. In that state it does well on almond stock. (See Peaches.)

PEACHES.

Peaches, plums, nectarines, apricots and cherries are propagated almost entirely by budding, the work usually being done in summer in the South (June budding) or, in the latitude of Missouri and northward, about the first of September. The process of budding for all of the fruits mentioned in this paragraph, including the growing of the stock, is practically the same, so that a description in full for peaches will answer for the whole.

Peach seeds must be frozen in order to secure best results in getting them to sprout. Peach seeds may be planted in the fall in the nursery rows, or stratified in boxes of sand (See Fig. 1) left uncovered in the shade of a building outside during the winter, where they will freeze, and are planted in spring. Nurserymen who raise peach stock on a large scale often place the seed on the ground in a heap and cover them with sand, the mass being allowed to freeze during the winter. When peach

seeds are gathered about the home for the purpose of growing budding stock, it is best not to allow them to lie in the sun and dry out during the late summer and fall. If they are placed in boxes of moist sand while they are still fresh, they often germinate more evenly when planted the following spring. Planting the seeds in fall is not as satisfactory as stratifying them in sand for freezing and in spring planting them in freshly prepared soil.

Stratify for freezing as described for apple seeds. For spring planting of peach seeds, the soil should be plowed the previous fall in order that it may be worked early in spring. Prepare as for a garden spot and lay off rows 4 feet apart with a single shovel plow; scatter the seeds in the furrow, from 1 to 2 inches apart and cover with about 2 inches of loamy soil. They may have to be planted when the soil is too wet to cover them properly. In this event, the furrows should be given a dressing an inch thick of well rotted manure. It is best not to plant these seeds on a soil that is too rich, as the young trees will make too rank a growth after being budded. The seedlings should be given good cultivation by plowing or hoeing during the summer.

In the latitude of Arkansas and Tennessee and farther south where the peach seeds may be sown in February, the seedlings by June are large enough to bud. When budded in June the tops are cut away as soon as the buds unite and the growth is very rapid, so that the trees by late autumn are large enough for planting in the orchard. While June budded trees are usually smaller than those budded in the autumn one year's time has been saved, which is often a matter of great importance to the grower of the trees, whether he be growing them for his own use or to sell.

For autumn budding, which is the most common practice, the buds should be inserted about the last

week in August or the first week in September. In general the budding should be done when the bark peels best. When the work is ready to be done the buds are to be selected from the desired varieties. Buds are always procured from young branches that have grown the same season budding is done. On these young branches there will always be a few inches toward the tip which is soft and immature, and therefore this part should be cut away. Peach tree twigs contain both flower buds and leaf buds. If flower buds only are present and were used for budding, they would do nothing but flower and die, while the leaf buds (also called wood buds) will grow and make a top to the tree. The best wood buds are found toward the middle of the twig.

The wood buds may be distinguished from the flower buds (also called fruit buds) by remembering that they are smaller, flatter and never so plump. A fruit bud can do no particular harm if there is also a wood bud. It is desirable to know this, as a wood bud will often have a fruit bud on either side of it. When this occurs the outside buds may be broken off, as they are of no use. Where there is only one bud at the base of the leaf, it is usually a wood bud, and where there are two or three in a row across the twig, it is almost certain that the middle one is a wood bud and the outside ones flower buds. After a little observation and practice it will not be difficult to select the proper kind of buds to use.

The weather is usually very warm at budding time, so that it will be necessary to wrap the twigs from which the buds are to be taken in a damp cloth or an old newspaper moistened on the inside to prevent their drying out. As soon as the twig is cut from the tree, trim off the leaves, leaving a piece of stem about half an inch long to hold to when the buds are being inserted. Fig. 18 (a). The manner of cutting the buds from the twig, which

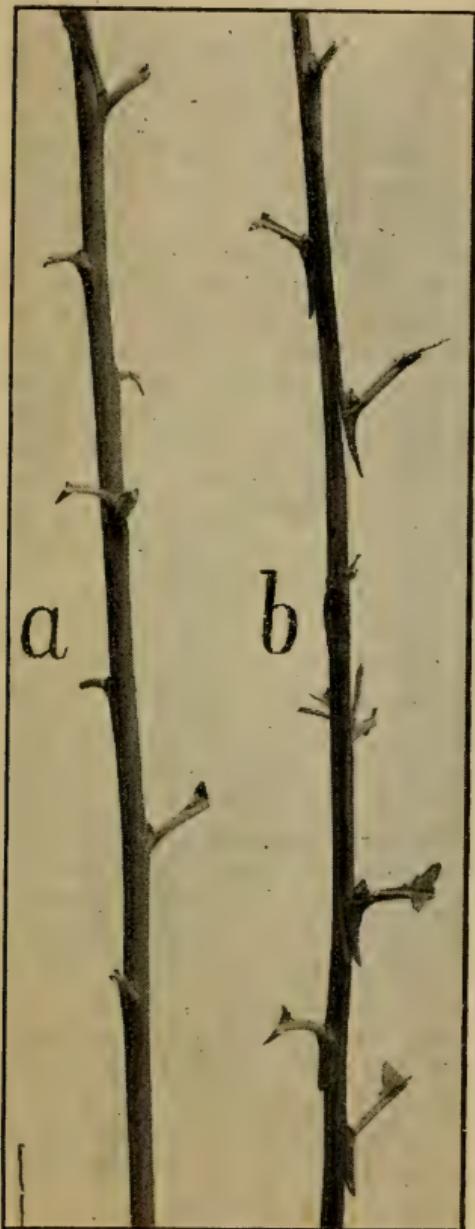


Fig. 18.

is known as a budding stick, is shown in Fig. 18 (b). Hold the budding stick in the left hand, upside down and, with the other hand force the knife blade down through the bark and into the wood, making a downward cut. Next, withdraw the knife and, at a point down nearly to where the cut stopped, make a cross just through the bark and no deeper. If the bark peels easily (and it should at budding time), the bud may now be lifted up and the bark will part from the wood very readily. While many prefer to have no wood adhering to the bud, there are some who slice the buds off from the twigs, leaving a portion of the wood attached to them.

Budding. The little seedling peach should be budded as

Fig. 18—Budding the peach: (a), shows desirable buds on the twig and manner of making cuts for removing them.

near the ground as it is convenient to work, which will be two or three inches from the surface of the soil. The first step in preparing the seedling to receive the bud is to make a slit in the bark lengthwise, and at the upper end of this slit a cross-cut, thus forming a T-shaped figure on the bark of the sprout, illustrated in Fig. 19 (a). The bark should peel readily, and in Fig. 19 (b) may be seen how it has been gently raised with the point of the knife and the flaps slightly rolled back. At this point the bud should be cut from the budding stick as directed and inserted beneath the bark of the sprout by holding with thumb and finger the short stem left for the purpose and gently forcing it downward, sharp end first, until the square end of the bud gets down to where it will fit against the cross-cut in the bark itself. In Fig. 19 (c) the bud is seen in position and ready for wrapping.

In order that the bud may form a union with the growing seedling, it is necessary to press it closely against the tree by binding with some sort of a string. Nurserymen commonly use a kind of grass known as raffia, which is wet before applying and adjusts itself to the parts to be covered and makes an excellent wrapper. A good substitute for raffia, easily obtainable by everyone, is strips a quarter or half an inch wide torn from an old handkerchief or similar old and thin linen or cotton goods. They are sometimes tied with strips of wet corn shucks. Whatever is used is to be bound around the newly inserted bud, as indicated in Fig. 19 (d), in such a manner as to leave only the stem of the leaf on the bud, sticking out. This leaf stem will serve as an indicator to show whether the bud has united or not. If the stem remains green the bud is living; otherwise it will turn brown in a day or two.

Do not wait longer than a week or ten days before

examining the buds to see if they are living. If they have united with the trees, release the bandage by cutting it on the opposite side from the bud in order not to disturb the healing wound. This early examination and cutting of the string must not be forgotten, as it is very important. At this time the little trees are making a very rapid growth in thickness and in a remarkably short time will grow over the string and literally choke the trees to death or, what is more to the point, will make a deep ring in

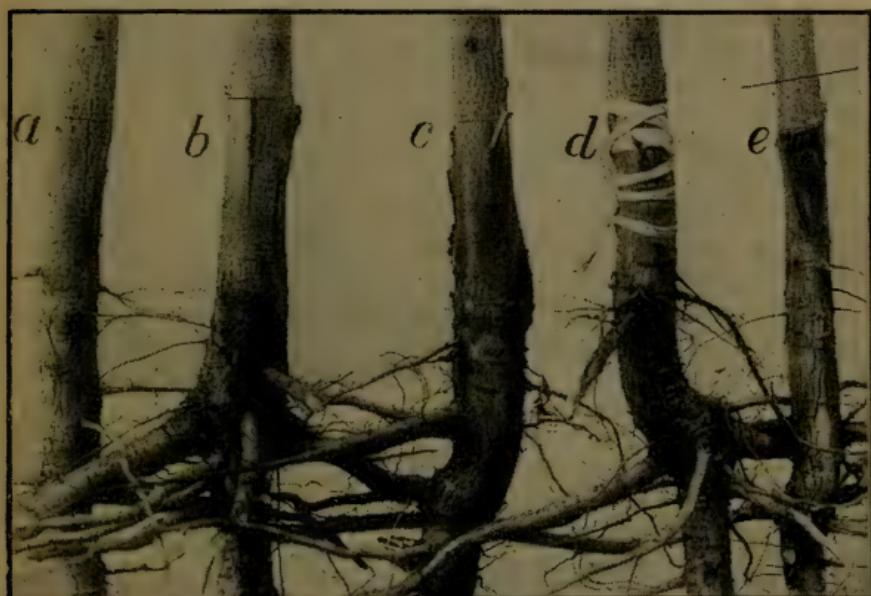


Fig. 19.

the tree and cause it to break off where the bud is inserted. During the autumn in which the bud is inserted in the tree it will make no growth other than to make a firm union with the stock, the bud itself remaining dormant.

The following spring the bud will begin to grow

Fig. 19—Budding the peach (continued): (a), T-shaped cut in bark; (b), bark raised for insertion of bud; (c), the bud in place; (d), the inserted bud properly wrapped with raffia or strip of thin cloth; (e), the bud united with the stock, the mark above the bud showing where the seedling should be cut off in June (in the

along with the other buds on the tree, and now the little tree must be cut off from one-half an inch to an inch above the bud, as shown by the mark in Fig. 19 (e). This will throw all of the growth into the new bud and it will shoot upward rapidly. A large number of little sprouts will be certain to spring up around the stump, and it will be necessary to rub them off two or three times during the early summer in order to keep the growth where it is wanted.

It is best to plant the peach seeds in rows running north and south, which will make it possible to bud all of the trees on the north side. This is thought to be desirable, because it is believed that the sun may injure the buds when they are first inserted. One season's growth from the bud makes trees of the proper age for planting in the orchard. In Missouri peach trees are commonly set in rows from 16 to 20 feet each way.

In a new region where it is desired to grow peaches it is often the case that varieties known to be successful elsewhere are planted extensively but on reaching bearing age are found to be unsuited to the soil, climate or other surroundings. In this event, all of the branches should be cut back to stubs from 2 to 4 inches long. These will throw out sprouts which may be budded the following season with the desired variety. Undesirable varieties are sometimes planted by mistake among other trees and may be top-worked or renewed with the desired sorts in the manner described.

PEARS.

Pears are propagated by both budding and grafting, like the apple. The essential differences between grafting pears and apples are: That the pear is always grafted on the whole seedling root, the scion being 4 to 6 inches long and the union being

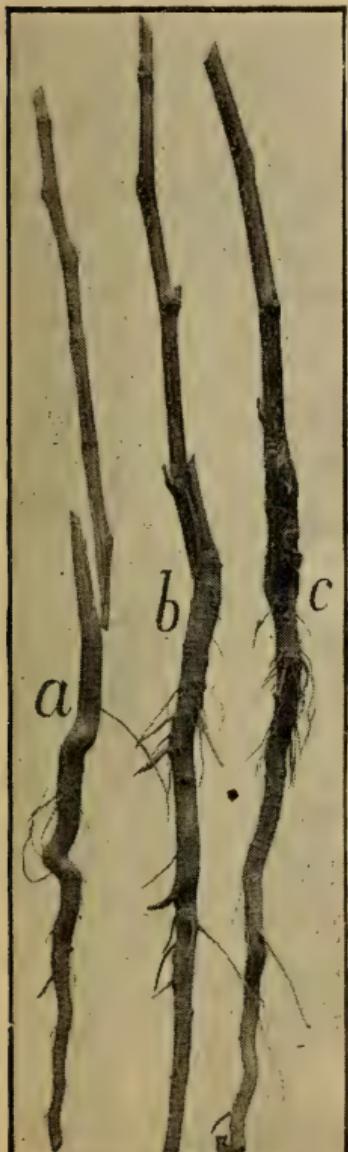


Fig. 20.

made at the crown. Also, after the graft is made, the wound must be entirely covered over with grafting wax. As soon as the hot wax is spread on, the graft should be dropped into a tub of water in order to cool it immediately. See Fig. 20 (a, b and c).

The seedling pear stock is not extensively grown in this country owing to the difficulty of securing the seed. Nurserymen import their stock from France, and persons desiring to do their own propagating may purchase seedlings from the nurserymen at reasonable prices. If pear seeds are procurable, it is easy to grow the stock by stratifying them in sand and allowing them to freeze, and otherwise treating them like apple seed. The management of the seedlings and scions and time of doing the grafting is the same as for the apple. For time, manner and precautions in planting the grafts the reader is referred to the discussion under apples.

Pear trees may be both budded and top worked in

Fig. 20—Grafting pears: (a), the whole seedling pear root cut off at crown and ready to be grafted; (b), the short scion spliced to the long stock; (c), the point of union, tied and covered with wax.

precisely the same way as that described for apples.

Dwarf Pears. If pear trees are grown upon pear roots, either by budding or grafting, they are known as **standards**. When worked on the quince root the pear is easily grown as a dwarf. It then comes into bearing earlier and, since the trees are small, the fruits can be thinned and the trees sprayed and the fruit therefore should be of a higher quality. Dwarfs require more care than the ordinary standards, however, and they should not be planted unless the owner understands this fact and is willing to give the attention that they need. Although the trees are by nature dwarf, since they are worked on a smaller growing species, they nevertheless tend to become half standard if left to themselves. A dwarf pear tree should never reach a greater height than twelve feet. In order to keep it down to this stature it is often necessary to remove from one-half to two-thirds of the annual growth late each winter.

A good dwarf pear tree is one in which the union with the quince stock is very close to the ground. When the tree is planted this union should be from 4 to 6 inches below the surface, after the ground has settled. It is the common belief that dwarf pears do not live as long as the standards. The variety that is oftenest grown as a dwarf is the Duchess. Other varieties propagated as dwarfs are Louise Bonne, Anjou, Clairgeau, Manning Elizabeth, and to a less extent, Bartlett, Seckel and Kieffer. Both standard and dwarf pears are ready to be planted in the orchard after growing in the nursery for one or two seasons, the two-year-olds being preferred.

PLUMS:

Plums are propagated by budding, a full description of the process being found under the peach. While the seeds of any of our common plums will

make desirable stock upon which to bud, nurserymen generally use either Myrobalan or Marianna stock. The former is used extensively in the North, but is inclined to sprout badly. The Marianna is much recommended in the South. Plum stock is extensively imported from France, owing to the difficulty in getting seeds in sufficient quantities for planting in this country. When plum seeds are to be planted they are to be treated in every respect like peach seeds.

Plum stock may be quickly and easily grown from hard wood cuttings of the Marianna plum. This variety, while often planted, is usually worthless so far as its fruit is concerned. The trees are always large and exceedingly vigorous, but they refuse to bear fruit. In early winter the twigs of the last season's growth may be taken and cut into sections about 6 or 7 inches long and stored away in green sawdust like apple scions. The cuttings are planted in spring in a well drained soil. A furrow with one straight side may be opened up with a small turning plow and the cuttings planted therein by standing them up, leaning slightly toward the south against the perpendicular wall of the furrow and have the earth packed tightly around them, especially near their base. The cuttings should be planted with only one or two buds left above ground. They will take root and make a growth large enough to bud the same season.

Plums are often budded upon peach stock in order that they may be grown upon locations where the plum roots would not thrive. Plum roots also make good stock upon which to bud peaches when the latter are to be grown in wet situations. Plums are usually grown in the nursery for one year after budding before being planted in the orchard. They may, however, be allowed to grow two years before

transplanting. In the orchard they are commonly set from 12 to 16 feet apart each way. For detailed directions for budding, see under peaches.

QUINCES.

Quinces are propagated in four ways: By cuttings of the ripened wood and also from pieces of roots treated like cuttings; mound layers; root grafting; and budding. Hard wood cuttings are employed by nurserymen who have light warm soils. They are handled like grape cuttings and made like currant cuttings. In mound layering the old plant is cut back to encourage a growth of sprouts from the crown. A mound of soil is then thrown up about them, as described for currants, and when rooted the sprouts are cut off. Plants so grown are not the most desirable, because of their tendency to sprout when set in the orchard. When root grafting is employed pieces of apple roots are spliced to the scions. These roots assist the cuttings in becoming established and often are removed when the nursery tree is transplanted to the orchard.

If budding is employed, the quince seedlings should be grown in the manner described for apples, the time and manner of budding being the same as for that fruit.

RASPBERRIES.

There are three kinds of raspberries, the reds, the blackcaps, and a cross (hybrid) between the two. Red raspberries are readily propagated by means of the sprouts springing up abundantly from the roots. They may also be propagated by means of root-cuttings in the manner described for blackberries. Plants of one season's growth are ready to be set in the permanent planting. The rows should be at least 4 feet apart and the plants 3 feet

apart in the rows. They quickly spread and cover all the ground between the plants and also between the rows if this space is not kept clear by regular summer cultivation.

Blackcap raspberries are propagated entirely by what is known as "root tips," illustrated in Fig. 21. The old plants produce long, drooping branches

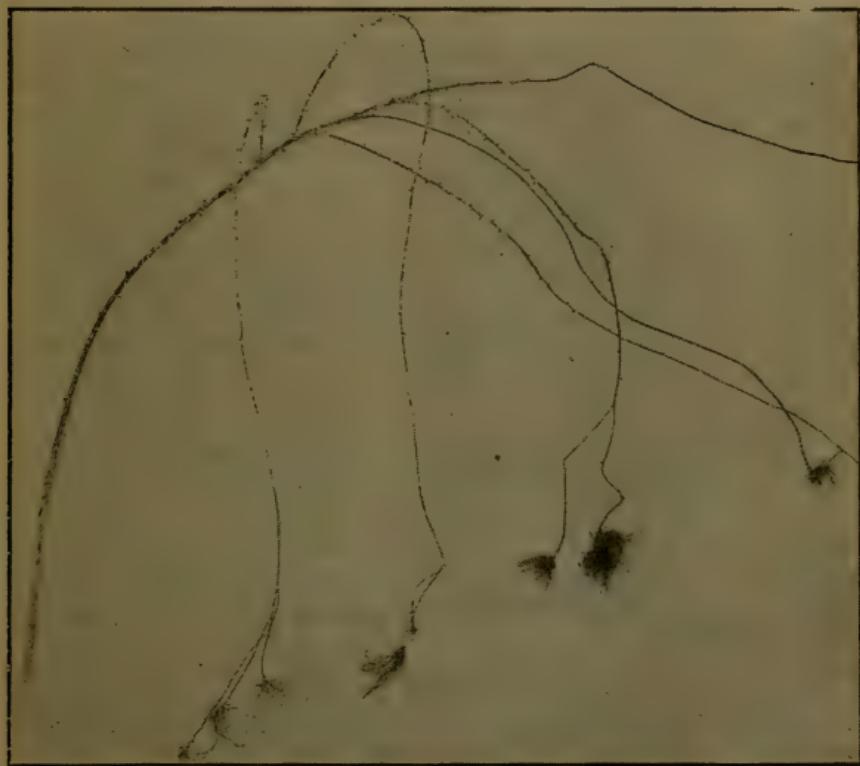


Fig. 21.

which bend over and touch the ground and take root at the tips. To take root readily the soil must be cultivated during the summer or else a shovelful of

Fig. 21.—How the blackcap raspberry takes root at the tips of its branches.

earth must be thrown over the tips of the branches in midsummer. To rapidly increase the plants by this method it is only necessary to pinch out the terminal bud when it begins to show a tendency to take root, which will cause from three to five branches to spring out at or near the end, each of which will soon touch the ground and take root. Of course these plants will not be as strong as a single one would be without the pinching.

The third form of raspberry is often classed with the red raspberries, although it is the result of a cross between the reds and the blackcaps. The fruit is very much like the reds, but in its manner of propagation it is like the blackcaps. The Shaffer (or Shaffer's Colossal) is the best representative of this type. All of the plants coming from root tips are formed in the summer and have two or three months in which to grow. The following spring the rooted branches may be cut off about 6 inches from the ground, thus leaving a handle by which to pick up the plants.

The root tips of both the blackcaps and the hybrid form are planted in spring in well prepared soil, the rows being 4 feet apart and the plants set 3 feet apart in the rows. These plants never sprout from the roots, hence the spaces in the rows between the plants are in no danger of being taken by sprouts.

STRAWBERRIES.

If the soil about the old plants is kept in a pulverized condition during mid and late summer by cultivation, strawberries are propagated readily and rapidly by means of runners. Each year in July after the fruiting season is well over with, the plants begin to throw out runners, which creep over the ground in all directions. These runners take root at the nodes (joints) very readily if they can touch a moist soil. After taking root a runner will

continue to increase in length, and may take root at several places, but the plants will gradually grow smaller toward the tip. In order to have strong plants, it is not advisable to take them from runners that have rooted at more than three places.

It is a custom among growers who raise large quantities of strawberries for shipment to grow their own plants for setting their plantations. They have found that it pays to set apart a special plot of ground for raising the plants to set. The plants used to propagate from are never permitted to bear any fruit, all of the flowers being carefully picked off as soon as they form. Under this treatment the plants throw out very strong runners. These are often pruned back in order to prevent their forming too many plants. The pruning is done with a sharp spade which is jabbed into the ground among the runners, or they are chopped off with a sharp hoe. However, all do not take these precautions. It is considered of more importance to prevent the plants from fruiting than it is to prune the runners.

For a home berry patch the young plants may be taken up in September of the season they were formed and set in the permanent planting where they will make considerable growth before cold weather. These will bear some fruit the following season. For a commercial planting, where the fruit is to be sold in large quantities on the open market, it is the unanimous verdict that the plants should not be set out in the field until early spring, and then not permitted to fruit any that season, the flowers all being picked off. Strawberries may be transplanted almost any time during the year when the ground is not frozen, but if set in the dry, hot weather of mid or late summer, it is very troublesome to keep them alive. If one is prepared to irrigate or otherwise prepared to water the plants reg-

ularly, they may be set at any time in summer or fall. This, however, applies only to small home plantings.

The strawberry being a cool-weather plant, that is, growing when the temperature is quite low, it is important in spring planting to get them out as soon after the frost is out of the soil as possible. Strawberry rows should be 4 feet apart and the plants in the rows set from 15 to 30 inches apart,—2 feet being about the average distance.

L.C.G.

CONTENTS.

APPLES—

	Page
Collection and care of seeds	6
Planting apple seeds	7
Growing apple stock (roots) for grafting— digging and storing	8
Collection of scions—kind of wood to use, storage, etc.	9
Making the common grafts—storage	10
Planting apple graft—precautions	13
Cleft-grafting	15
How to make grafting wax	18
Budding apples	19
Dwarf apples	19

APRICOTS—

Care and planting of seeds	20
----------------------------------	----

BLACKBERRIES—

Ways of propagating—Sprouts and root-cut- tings	21
--	----

CHERRIES—

Kinds of cherry stock	22
Budding and grafting	23

CURRANTS—

Cuttings; how made, care of, planting, etc..	23-24
Mound-layerage; how propagated by this method	25

DEWBERRIES—

Propagation and planting	26
--------------------------------	----

GOOSEBERRIES—

Cuttings and layers—how made; planting....	26
--	----

	Page
GRAPES—	
Propagating by layers	26
How to make the common cuttings.....	27
Care and planting of cuttings.....	28
Grafting grape vines	29
Single-eye cuttings	29
NECTARINES—	
What they are and how propagated	30
PEACHES—	
Care of seeds before planting	30
Planting peach seeds	30-31
June budding	31
Autumn budding	31
Selection of buds and details of budding.....	32-36
PEARS—	
How propagated—budding and graftage.....	36
Pear stock; how procured	37
Dwarf pears—Standard pears	38
PLUMS—	
Growing plum stock from seeds and cuttings..	38
Budding plums	39
QUINCES—	
Propagation by cuttings	40
RASPBERRIES—	
Red raspberries—propagation of by root-cut- tings, etc.	40
Blackcap raspberries—propagation by root-tips	41
Hybrid raspberries—propagation by root-tips..	42
STRAWBERRIES—	
Propagating from runners	42
Transplanting strawberries—spring, summer, fall	43-44

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